

Claims 62, 79-85, 90, 97-100 and 102 were rejected under 35 USC § 112, second paragraph. The claims have been amended in response to the objections raised by the Examiner in the Office Action. It is respectfully submitted that the amended claims are in full compliance with 35 USC § 112.

Claims 18, 19, 36, 42, 43, 57-64, 71 and 87-91 were rejected under 35 USC § 102(e) as being anticipated by Kata et al. (U. S. Patent No. 5,897,337). Favorable reconsideration of this rejection earnestly solicited.

Amended claim 18 clearly defines the resin layer is a compressed one. This is supported in the original specification (see, for example, page 65, the third complete paragraph).

Kata (USP 5,897,337) teaches an adhesive layer 43 is formed by using a spin coating method or sticking film of adhesive (column 7, lines 20-26).

In contrast, the resin layer of claim 18 is a compressed one and can closely contract the chip surface. On the other hand, the adhesive layer 43 of Kata is formed by potting resin in spin coating or merely sticking a film of adhesive. Thus, the adhesive layer 43 does not closely contact a member, so that it may peel off the member. As evidence to support this argument, Kata teaches the following. At the time of mounting a device as shown in Fig. 8E on a substrate, in order to compensate for low reliability of the adhesive layer 43 on the chip, the adhesive layer 43 is heated so that it softened to improve the degree of adhesion of the adhesive layer 43, as shown in Fig. 9B and described in column 8, lines 23-26.

In contrast, claim 18 defines a compressed resin layer, which can closely contract the substrate. Hence, claim 18 does not need the step of softening the resin layer.

According to Kata, protruding electrodes are defined by forming holes in the resin layer and performing a plating process in which the metal layer is merely grown in the holes. Thus, the protruding electrodes thus formed merely touch the resin layer.

According to claim 18, the compressed resin layer is forced to closely contract the protruding electrodes due to compression of the resin layer after the protruding electrodes are formed. If a temperature variation is applied to the semiconductor device of Kata, gaps will be formed between the protruding electrodes and the resin layer because the resin layer and the protruding electrodes do not closely contract each other and the protruding electrodes and the resin layer have different thermal expansion ratios. Then, moisture may enter the gaps and the chip surface may be degraded. On the other hand, according to claim 18, the compressed resin layer closely contracts the protruding electrodes, so that gaps cannot be formed. Thus, the chip surface is hermetically sealed so that high reliability can be ensured.

As discussed above, the compressed resin layer is not anticipated by Kata, and strengthens the contract between the chip and the resin layer.

It is noted that Japanese Laid-Open Patent Application No. 5-55278, which was submitted together with the Information Disclosure Statement in an Office Action issued against the corresponding Korean Patent Application (another Information Disclosure Statement is filed herewith in regard to this Office Action) discloses that a resin layer is formed by a spin coating method as in the case of Kata and has problems as described above. According to JP '278, in order to improve the reliability of the resin layer formed by spin coating, an under fill resin is needed at the time of mounting the chip to a printed circuit board.

When the resin is formed on the wafer by spin coating, the above-mentioned problems arise. In contrast, claim 18 does not have the above-mentioned problems. It is believed that no prior art documents show that the protruding electrodes are provided on a semiconductor chip and are partially sealed by a compressed resin layer.

It will be noted that the compressed resin layer may be formed by another process with pressure being applied to the resin, such as a transfer molding process.

In regard to claim 36, the Examiner states that Kata teaches external connection electrodes 44 are exposed at a lateral surface on the resin layer. However, the figures do not show such an arrangement. Figs. 10A and 10B are plan views of a part of the semiconductor chip including the pads 41 and the adhesive layer 43. The cross-sectional views of the arrangement shown in Figs. 10A and 10B does not show the electrodes 44 exposed at a lateral surface of the resin layer 44.

In regard to claims 42 and 43, these claims have been amended to specify a compressed resin layer. Thus, for the same reasons discussed above, these claims are not anticipated by Kata et al.

Amended claim 57 clearly defines that a plurality of semiconductor elements are provided to the electrode plate.

In contrast, Kata fails to teach or suggest that a plurality of semiconductor elements are sealed as a whole. It is noted that a member indicated by a reference number 46 is a coating film, which is not a compressed film. Thus, amended claim 57 and claims depending therefrom are not anticipated by Kata.

In regard to claim 71, like amended claim 57, Kata et al. fails to teach or suggest that a plurality of semiconductor elements are sealed as a whole. Furthermore, Kata et al. does not teach or suggest a compressed resin film.

In regard to claim 87, the Examiner argues that resin layer 43 of Kata et al. is a compressed one. However, as discussed above with regard to claim 18, Kata et al. teaches that the resin layer 43 is formed by a spin coating method or a method of sticking a film. Thus, the Examiner is incorrect in asserting that Kata et al. discloses a compressed resin layer.

Claim 88 also specifies a compressed resin layer. Thus, for at least the same reasons discussed above, claim 88 is not anticipated by Kata et al.

Claim 90 has been amended to specify a compressed resin layer. Furthermore, claim 91 has been amended to specify that the resin layer slightly covers upper portions of protruding electrodes (see the 4th and 5th lines from the bottom of page 69 of the specification). Kata et al. fails to teach or suggest these features.

Claim 41 was rejected under 35 USC § 103(a) as being unpatentable over Kata et al. Favorable reconsideration of this rejection is earnestly solicited.

Claim 41 includes the limitation of "compressed" resin layer which has the unique advantages discussed above. Kata et al. fails to provide any teaching or suggestion of a compressed layer or the advantages associated therewith.

Claims 54-56 were rejected under 35 USC § 102(e) as being anticipated by Kitahara. Favorable reconsideration of this rejection is earnestly solicited.

The protruding electrodes defined in the claims may correspond to the outer lead portions 32 of Kitahara, which is characterized in that the outer lead portions 32 are not supported by the base 41. In order to hold the floating state of the outer lead portions 32, it is required to pay

attention to preventing the portions from being smashed during the production process or thereafter.

In contrast, the protruding electrodes are located on the extending portions formed to the wiring board and are thus supported by the wiring board. Thus, the claimed arrangements are not anticipated by Kitahara.

Claims 79, 82 and 83 were rejected under 35 USC § 103(a) as being unpatentable over McMahon and Kata et al. Favorable reconsideration of this rejection is earnestly solicited.

Claim 79 has been amended to specify a compressed resin layer. As discussed above, the compressed resin layer provides unique advantages and is not suggested by the cited art.

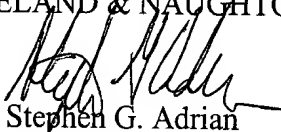
For at least the foregoing reasons, the claimed invention distinguishes over the cited art and defines patentable subject matter. Favorable reconsideration is earnestly solicited.

Should the Examiner deem that any further action by applicants would be desirable to place the application in better condition for allowance, the Examiner is encouraged to telephone applicants' undersigned attorney.

In the event that this paper is not timely filed, applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees which may be due with respect to this paper, may be charged to Deposit Account No. 01-2340.

Respectfully submitted,

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Attachment: Information Disclosure Statement

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